

## Claims

1. A method of performing chemical reactions comprising:
  - supplying substances for a chemical reaction into a reaction chamber(4), which is adapted to withstand high temperature and pressure ,
  - 5 - applying microwave heating to initiate the chemical reaction and reach a desired temperature and,
  - instantaneous cooling the reaction mixture to a desired lower temperature by using adiabatic cooling.
- 10 2. A method according to claim 1, further comprising
  - maintaining the desired temperature substantially constant for a desired time to carry out the chemical reaction.
- 15 3. A method according to claim 1 or 2, wherein the cooling is obtained by increasing the volume of the reaction mixture by letting it expand into an expansion vessel 9.
- 20 4. An apparatus for performing the method according to any one of claims 1-3, comprising a reaction chamber (4) having at least an inlet and an outlet and adapted to withstand high temperature and pressure, a microwave heating source for heating a reaction mixture and a cooling means for adiabatic cooling of the reaction mixture comprising a valve (8), a tubing (10) and an expansion vessel (9).
- 25 5. An apparatus according to claim 4, wherein the volume ratio between the volume of the expansion vessel (9) and the volume of the reaction chamber (4) is between 1 to 500.
- 30 6. An apparatus according to claim 4 or 5, wherein it further comprises more than one expansion vessel(9) operationally connected to the reaction chamber (4).
- 35 7. An apparatus according to any of claims 4-6, wherein the bottom end of tubing (11) is positioned at the lower end of the reaction chamber (4) at or below the liquid phase level of the reaction mixture.

8. Use of a method according to any of claims 1-3 for performing organic synthesis reactions.

5 9. Use of an apparatus according to any of claims 4-7 for performing organic synthesis reactions.

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